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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/706,925	11/14/2003	David G. Frank	9351-218	7652
1059	7590	12/13/2005	EXAMINER	
BERESKIN AND PARR 40 KING STREET WEST BOX 401 TORONTO, ON M5H 3Y2 CANADA			BELL, BRUCE F	
			ART UNIT	PAPER NUMBER
			1746	
DATE MAILED: 12/13/2005				

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/706,925	Applicant(s) FRANK ET AL.	
	Examiner Bruce F. Bell	Art Unit 1746	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-30 is/are pending in the application.
4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-3, 6, 8, 18, 23 and 25-29³⁰ is/are rejected.
- 7) ☒ Claim(s) 4, 5, 7, 9-17, 19-22 and 24 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 14 November 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. ____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|--|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>6/9/05; 11/14/05</u> | 6) <input type="checkbox"/> Other: ____ |

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 18, 25-29 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 18 lacks antecedent basis for "the clamping pressure".

Claims 25 is vague and indefinite with respect to component (a). There does not appear to be a component (a) in any of the dependent limitations on which this claim is based. It is unclear as to what applicant is claiming as component (a).

Claims 26-29 lack antecedent basis for "the curable elastomeric material".

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1-3, 6, 8, 23, 26-28 and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chi et al (4397917) in combination with Lifferth (4050700) and Barton et al (6057054).

Chi et al disclose a fuel cell assembly having a plurality of fuel cells stacked together in such a manner that the fuel cells are connected internal of the stacked fuel cell. A plurality of passages extend through the stack and are adapted to receive either mechanical and/or chemical means for interconnecting the cells. A high strength adhesive material is inserted in the passageways and cured to provide an interconnecting bond. The internal connecting means may be disposed between facing surfaces of selected adjacent elements in the cell and selected adjacent elements of successive cells. See col. 1, line 57 – col. 2, line 24.

Chi et al does not disclose that the adhesive (seal) is liquid or that the gas is vented simultaneously as passageways are filled.

Lifferth discloses a seal made of one or more formed sealant receiving grooves, a fitting connected into the groove or grooves to allow sealant to be injected there through and a sealant material that can be injected through the fitting into the groove or grooves and that will retain its fluid characteristics while remaining in its assigned position. See abstract. The patent discloses that the seal is useful between two mating parts. The groove is injected with a flowable sealant material under pressure through a fitting, until the groove is full of sealant. Addition fittings (ports) in the grooves can be used to remove trapped air in the grooves. See col. 2, lines 9-40. The injected seal is disclosed to be a replacement for conventional seals. See col. 2, lines 62-63. Sealants that may be injected are disclosed to be liquid plastic, liquid rubber, liquid Teflon and liquid nylon. See col. 1, lines 45-47.

Barton et al disclose an improved MEA having a resilient fluid impermeable integral seal made by impregnating the sealing material into the porous electrode layers in the sealing regions. The integral seal circumscribes the active areas of the MEA. The uncured sealant material is a flow processable elastomer that is applied to the MEA using a vacuum injection molding process and which seal has improved protection against fluid leaks. See abstract. The fuel cell stack has sealing regions that cooperate with separator plates to prevent fluids from leaking around the edges of the MEA. The sealant material is one of an elastomer that is injection molded, which elastomer may be a thermosetting material. See col. 3, lines 41-52. The fuel cell stack is assembled and placed inside a mold wherein the curable flow processable sealant material is introduced into the mold and is directed to the sealing regions of the MEA and impregnated into a portion of the seal regions and then cured to form the integral seal, upon which the MEA is removed from the mold. See col. 5, lines 13-30. The mold has open channels that facilitate distribution of the sealant material to the sealing regions. See Col. 5, lines 38-42. The elastomeric sealing materials can be chosen from thermosetting materials, silicones, fluoroelastomers, fluorosilicones, ethylene propylene di-methyl and natural rubber. See col. 6, lines 59-63. The fuel cell assembly is further disclosed to have a part which is used to facilitate alignment of the MEA with the separator plate. See col. 7, lines 57-62. One embodiment of the patented invention is the use of a recessed groove in the separator plates so

that there is less damage to the plates when the MEA is compressed between the separator plates. See col. 8, lines 29-48.

The subject matter as a whole would have been obvious to one having ordinary skill in the art at the time the instant invention was made because even though the prior art of Chi et al does not disclose that the adhesive is a liquid sealant, the adhesive in Chi et al appears to flow into the passages to fill and bond the fuel cell structure, since Chi et al does not disclose that the adhesive is a seal, the prior art of Lifferth is disclosed to show that liquid sealants are known and are conventional in the art and are readily used in applications such as grooved areas where the sealant can be flowed into the groove and the grooves are vented to remove gas entrapped therein, to allow the material to completely fill the grooved area, so that a proper seal may be obtained. Even though the prior art of Chi et al discloses an adhesive rather than calling the adhesive a seal, the person having ordinary skill in the art would recognize that fuel cells have to be sealed together to prevent mixing of the reactant materials (hydrogen and oxygen) within the cell. The recitation in the instant claims with respect to the venting of gas when injecting sealing materials is also shown by way of the Lifferth patent. Venting of gas from passages being filled with an injected liquid material is conventional in the art and is done for the purpose of allowing the material to flow and fill passages completely with out any air voids which would affect the ability of the fill material to properly seal the passages and prevent

leakage of reactant materials from one part of the device to another. The recitation in the instant claims with respect to the pressures required and time needed to fill the passages is also conventional in the art. It is known to pressurize the material to push it through the passageways and to ensure complete filling of the areas required to be sealed. Cleaning of surfaces which are to be sealed is also conventional in the art and is known to be done for the purpose of removing any foreign material which would affect the complete sealing of surfaces to which the material is applied. Preheating is also conventional in the art and is known to be done for the purpose of partially curing the sealant as it flows into the area to be sealed, so that the liquid sealant does not bleed out of the seal area, due to the viscousness of the liquid sealant. The prior art of Barton et al is cited for its teaching of the particular injectable sealant materials and for the alignment of the MEA to the separator plates. The prior art of Chi et al in combination with Lifferth and Barton et al render the applicants instant invention obvious for the reasons set forth above.

Allowable Subject Matter

5. Claims 4, 5, 7, 9-17, 19, 20-22 and 24 are allowable over the prior art of record.
6. Claims 4, 5, 7, 9-17, 19, 20-22 and 24 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.
7. The following is a statement of reasons for the indication of allowable subject matter: The prior art of record fails to teach and/or suggest the following aspects of the

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instant invention: (1) use of a primer material being applied to the separate elements so as to improve the bonding of the seal material to the separate element; (2) curing the seal material by passing heated water through the assembled fuel cell; (3) assembling and clamping the separate elements together prior to injecting seal material into groove network; (4) including a recess in each of the flow field plates to accommodate the gas diffusion layers and clamping the flow field plates together so that the pressure on the gas diffusion layers is determined by the recesses depth and is unaffected by injection of the seal material; (5) forming a vent in the groove network by scratching a surface of one of the elements; (6) forming offset grooves in the opposed flow field plates to prevent distortion of the PEM during injection of seal material; and (7) injecting separate seal materials into each groove network.


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Bruce F. Bell whose telephone number is 571-272-1296. The examiner can normally be reached on Monday-Friday 6:30 AM - 3:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Barr can be reached on 571 272-1414. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

BFB
December 8, 2005


Bruce F. Bell
Primary Examiner
Art Unit 1746